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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/604,454	07/22/2003	Scott William Petrick	13200XZ (GEMS 0201 PA)	1453

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EXAMINER

ROSENBERGER, FREDERICK F

ART UNIT	PAPER NUMBER
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2878

DATE MAILED: 04/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/604,454

Applicant(s)

PETRICK ET AL.

Examiner

Frederick F. Rosenberger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-10 is/are allowed.
- 6) ☒ Claim(s) 11, 13-15 and 20 is/are rejected.
- 7) ☒ Claim(s) 12, 16, and 17-19 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>7/22/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **39** (as mentioned on page 25, line 10 of paragraph 62) and **50**" (as mentioned in line 9 on page 14). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

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3. The disclosure is objected to because of the following informalities: On page 21, line 1 of paragraph 56, it appears that the designated "step **138**", in reference to Figure 6, should be "step **128**".

Appropriate correction is required.

Claim Objections

4. Claims 17 and 18 are objected to because of the following informalities:

In claim 17, applicant makes reference to "said protection element". Such recitation lacks proper antecedent basis, as there is no prior mention of the protection element in parent claims 11 or 12.

In claim 18, applicant makes reference to "said integrator". Such recitation lacks proper antecedent basis, as there is no prior mention of the integrator in parent claims 11 or 12.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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6. Claims 11 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Petrick et al. (US Patent # 5,920,070) in view of Applicant's Own Admission of Prior Art (hereinafter referred to as APA).

Petrick et al. disclose an X-ray imaging system comprising:

A detector **12** (Figure 1) having a plurality of pixels **22** comprising;

Data lines, in the form of column conductors **42** (Figure 2);

A common contact at a common contact voltage potential V_b (Figure 2);

A readout circuit, in the form of charge integrators **44** (Figure 2) coupled to the data lines **42**;

And a controller **34** (Figure 1), which, in cooperation with the bias control **46** is capable of adjusting the voltage potential V_b of the common contact in response to the operating state of the readout circuit (column 3, lines 7-10).

Petrick et al. do not specifically disclose that the readout circuit is capable of having different power states, although different operating states for applying different voltage biases to the photodiodes are identified. However, APA teaches that readout circuits for X-ray imaging systems are often provided with multiple power states so as to minimize power consumption during periods of nonuse (see page 3, paragraphs 6-8 of Applicant's disclosure).

Thus it would have been obvious for a person having ordinary skill in the art to modify the combination of Petrick et al. to provide a readout circuit with multiple power states so as to be able to power the readout circuit off during periods of nonuse to minimize energy consumption, as taught by APA.

Petrick et al. further disclose that the scanning circuit (referred to as acquisition control circuitry) remains active during changes in the readout operating state (i.e. imaging versus idling during photodiode recharge) (column 3, lines 47-53).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrick et al. and APA, as applied to claims 11 and 14 above, and further in view of Kimura et al. (US Patent # 6,399,950).

Petrick et al. disclose all of the limitations of the parent claims 11 and 14, as discussed above. However, Petrick et al. are silent with regards to the added limitation of claim 15, wherein the controller adjusts the voltage potential of the common contact for biasing the photodiodes in response to the charge across the photodiodes. Instead, Petrick et al. only disclose adjusting the voltage potential in response to the different read states of the readout circuit.

Kimura et al. teach that control of the bias voltage, in this case on-off operation, can be based on the current delivered to the detection element of the radiation imager to prevent voltage breakdown of the switching elements (column 2, lines 12-18). As the current is just the delivery of charge necessary to replenish the photodiode to a pre-exposure level, dependence of the control of the bias voltage based on the current is equivalent to being based on the charge across the photodiode.

Thus, it would have been obvious to a person having ordinary skill in the art to modify the combination of Petrick et al. and APA such that the control of the bias

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voltage is based on the charge across the photodiode in order to actively protect the photodiode elements and circuits from voltage breakdown, as taught by Kimura et al.

8. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Petrick et al., as applied to claim 11 above, and further in view of Sako et al. (US Patent # 6,714,623).

Petrick et al. disclose all of the limitations of the parent claim 11, as discussed above. However, Petrick et al. are silent with regards to the added limitations of claim 20, wherein the controller enables X-ray image acquisition when the voltage error signal is below a set level.

Sako et al. teach that acquisition of an X-ray image is prevented until the circuit elements are sufficiently stable and thus minimizing error signals (column 7, lines 21-29 and lines 43-52) to allow for good image quality.

Thus, it would have been obvious for one of ordinary skill in the art to modify the combination of Petrick et al. and APA such that the controller prevents image acquisition until error is below a predetermined threshold so that good image quality can be attained, as taught by Sako et al.

Allowable Subject Matter

9. Claims 1-10 are allowed.

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10. Claims 12, 16, and 17-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

Claim 1 addresses a method of maintaining an initial bias of an X-ray detector wherein after an initial bias is set, a common voltage potential applied to the photodiodes of the detector are adjusted to compensate for a data line drift amount caused by alterations in the operating state of the readout circuit. While aspects of the prior art due address alteration of the common voltage bias of a photodiode array, the prior art is silent with regards to the adjustment of the bias by the drift amount on the data line of the readout circuit for the photodiode array. The prior art is further silent with regards to those changes being predicated upon a change in the power state of the readout circuit as opposed to changes in different readout scenarios for the readout circuit. As such, applicant's disclosure provides a novel and nonobvious improvement over the prior art. Accordingly, the claim 1 would be allowable. Claims 2-10 would also be allowable by virtue of their dependency on claim 1.

Claim 12, when incorporating the limitations of claim 11, addresses an X-ray imaging system with a controller for adjusting a voltage potential of photodiode array in response to changes in the power state of the readout circuit. The prior art is silent with regards to the changes that a controller would respond to being a change in power

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state. As such, applicant's disclosure provides a novel and nonobvious improvement over the prior art. Accordingly, the claim 12 has allowable subject matter. Claims 17 and 18 also have allowable subject matter by virtue of their dependency on claim 12.

Claim 16, when incorporating the limitations of claim 11, addresses an X-ray imaging system wherein the readout circuit has integrators coupled to the pixels of the detector and protection elements coupled to the integrators. Per the limitations of the claim, these protection elements are allowed to conduct when the integrator is powered off. While protection or voltage clamping elements are often included with the photodiodes themselves to protect against overvoltage scenarios, the prior art is silent with regards to protection elements coupled to the integrators of a readout circuit, which are enabled to conduct when the integrators are powered off. As such, applicant's disclosure provides a novel and nonobvious improvement over the prior art. Accordingly, the claim 16 has allowable subject matter.

Claim 19, when incorporating the limitations of claim 11, addresses an X-ray imaging system wherein the controller adjusts the common voltage bias on the photodiode pixels of the detector to maintain an initial bias value. Neither Petrick et al., as described above in regards to claim 11, nor the prior art as a whole discuss the maintenance of an initial bias. Rather, modification of the common voltage bias is typically done to compensate for different readout conditions (as per Petrick et al.) or as a protective measurement (as per Kimura et al.). As such, applicant's disclosure provides a novel and nonobvious improvement over the prior art. Accordingly, the claim 19 has allowable subject matter.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Tomisaki et al. (US Patent # 6,696,687) disclose a radiation detector with a matrix photodiode array wherein noise signals due to TFT on/off switching in the readout circuit are compensated through adjustment means to improve the signal to noise ratio.

Albagli (US Patent # 6,266,391) disclose a method for artifact compensation in a matrix-addressed X-ray imaging panel. Specifically, an average change in signal value is used to adjust readout signals to give an image signal accurately representing the body under test (column 5, lines 1-10 and 31-39).


13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday-Friday 7:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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